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at sides, spinous at suture. Prosternum arcuately convex. Femora and anterior tibiæ on the inner side dentate.

Length 23–31 mm.

Habitat.—Southwest Florida; Cuba; Mexico; Nicaragua.

This species has to be placed near *Ergates.*

COCCIDÆ OF JAPAN (III). FIRST SUPPLEMENTAL LIST OF JAPANESE COCCIDÆ, OR SCALE INSECTS, WITH DESCRIPTION OF EIGHT NEW SPECIES.

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(WITH PLATES VII–IX.)

In the present paper are listed 18 species of Coccidæ, or scale insects, from Japan, which were collected by the writer and others, and studied by the writer since his last paper on "Coccidæ of Japan" (*Bull. of Imp. Agr. Exp. Sta.,* Vol. I, No. 2). Eight of these species are new to science, two species are new to Japan, while the remaining species have been previously recorded from Japan by various writers, although this is the first time they were actually found by the writer in his native country.

The generic names employed are those that have been in general use to within the last few years. A number of very radical changes in the nomenclature have been put forward, but I prefer to retain for the present the well-known names with which we have become familiarized.

The writer's thanks are due to Prof. T. D. A. Cockerell, for kindly reviewing his manuscript and specimens.

1. Icerya purchasi Mask.

I received specimens of this insect from Mr. I. Nitoba, Formosa Agricultural Experiment Station, and Mr. M. Hino, Formosa Horticultural Experiment Station, in the fall of 1908. It was probably introduced from Australia, recently, and is very destructive at Taihoku City. The host plants known in Formosa are as follows:

Acacia richii A. Gr.
Pithecolobium dulce Benth.
Albizzia lebbek Benth.
A. moluccana Boio.
Lespedeza cyrtobotrya Mag.
Pterocarpus indicus Willd.
Lespedeza juncea Pers.
L. sieboldi Moq.
Cassia sp.
Grevillea robusta Cunning.
Erythrina corallodendron L.
Poinciana regia Boj.
Indigofera tinctoria L.
Citrus medica L.
C. decumana L.
C. bigaradia Duham
C. nobilis Lous.
Callicarpa formosana Rolfe.
Pyrus sinensis Lind.
Rosa centifolia L.
Bischoffia javanica Blum.
Macaranga tanarius Muell.
Ricinus communis L.
Codiæum variegatum Blum.
Spium sebiferum Koxb.
Mallotus japonicus Fr. et S.
Casuarina quadrivalvis La Bill.
C. cunninghamiana Maq.
C. equisetifolia Forst.
C. suberosa Willd.
C. torulosa Ait.
C. distyla Vent.
Pamaris juniperina Bge.
Ficus retusa L.
F. carica L.
Citrus japonica Thunb.
C. medica var. *chirocarpus* Lour.
Murraya exotica L.
Ægle spioria Dc.
Pyrus communis L.
Musa sapientum L.
Salix babylonica L.
S. warburgii Seem.
Artemisia vulgaris L.
A. capillaris Th.
Bidens pilosa Linn.
Carica papaya L.
Cinnamomum camphora Nees.
Trema orientalis Bl.
Viburnum erosum Thunb.
Durantia plumieri Jacq.
Tectona grandis L.
Ficus pumila L.
Perilla neukinensis Dene.
Slevia coccinea.
Nandina domestica Thunb.
Lawsonia inermis L.
Ecdysanthera utilis Hayet Kaw.
Nerium odorum Soland.
Thea sinensis L.
Antigonon leptopus.
Polygonum multiflorum Ph.
Callistemon lanceolatus Dc.
Eucalyptus robusta Smith.
Celtis sinensis Pers.
Psychotria elliptica Ker.
Magnolia longifolia.
Hibiscus mutabilis L.
Calophyllum luophyllum.

2. Asterolecanium bambusæ Bdv.

Liu-Kiu Islands, on bamboo, collected by Mr. T. Kuroiwa, 1897. This is the first record from Japan.

3. **Asterolecanium pasaniæ, new species (Kuw. & Ckll.).** (Pl. VII, Figs. 1–6.)

Ovisac of Female.—Glassy and semitransparent; elongate in form, slightly narrowed toward posterior end, convex; median longitudinal ridge distinct. General color greenish yellow, with well-developed pinkish fringes; the anterior half is usually more or less yellowish brown. Ventral surface flat. Length about 1.5 mm.

Adult Female.—Boiled in KOH the body changes to reddish purple; subcircular; margin with one row of figure-of-8 glands, and within them a single series of small simple glands. Antennæ small, consisting of a single conical segment, with a strong spine. Mouth parts large, well formed. Posterior end with two lobes, each with a single long spine.

Habitat.—Hachijo Jima, on *Pasania cuspidata* Oerst. Collected by the writer, September, 1905. This species has not as yet been found on the mainland.

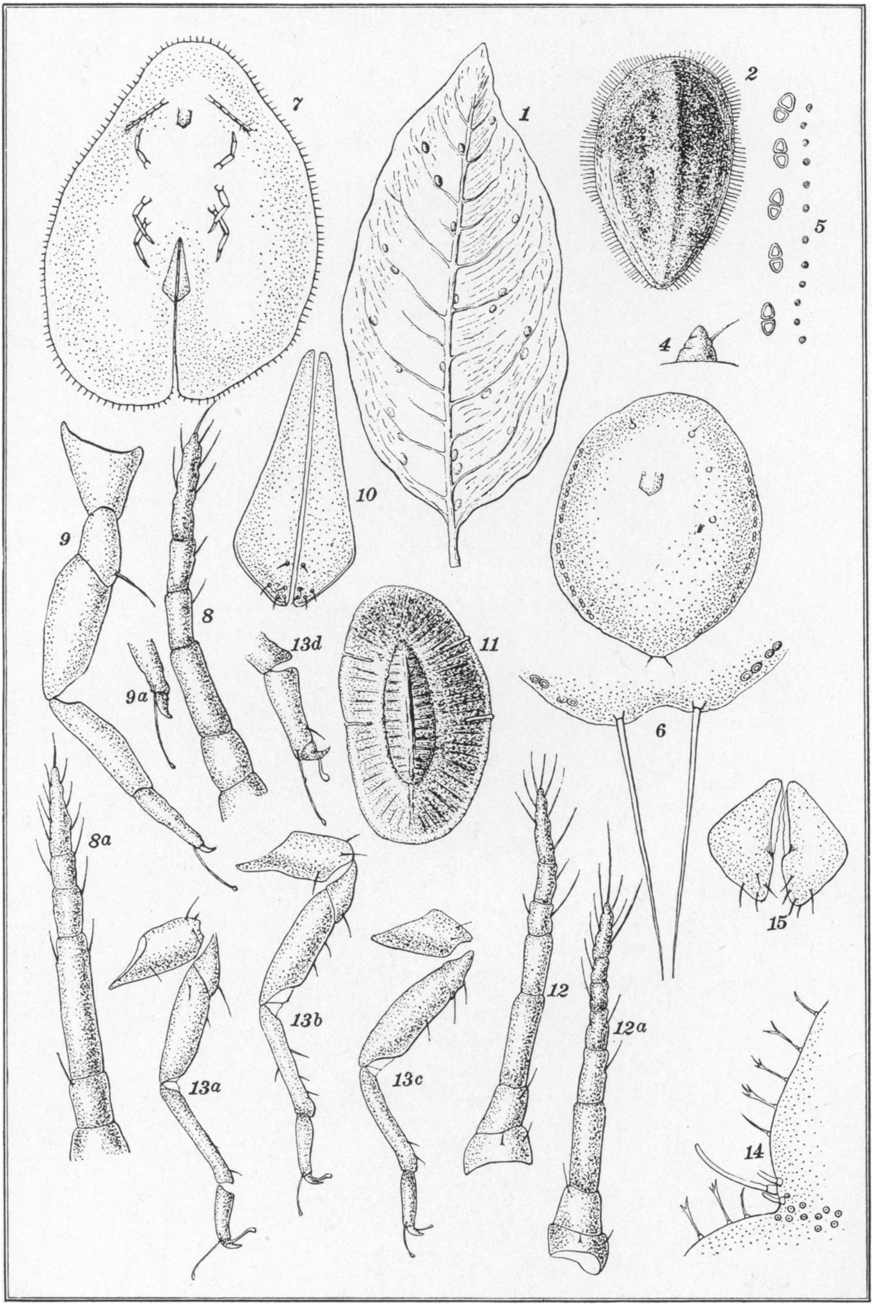
Note.—"Your coccid from Hachijo Jima is not a *Lecaniodiaspis,* but is a species of *Asterolecanium,* of the subgenus *Bambusaspis* Ckll. 1902. The known species of *Bambusaspis* are: *A. miliaris* Bdv., *A. bambusæ* Bdv., *A. delicatum* Green, *A. solenophoroides* Green, *A. palmæ* Ckll. and *A. urichi* Ckll. Yours is perhaps nearest to *A. delicatum,* but I believe it is new."—Ckll., Oct. 27, 1905.

"I have now compared your species with *A. delicatum* Green. I find that the latter is quite different. *A. delicatum* has a much longer fringe which is entirely light yellow (not reddish)."—Ckll., Nov. 4, 1905.

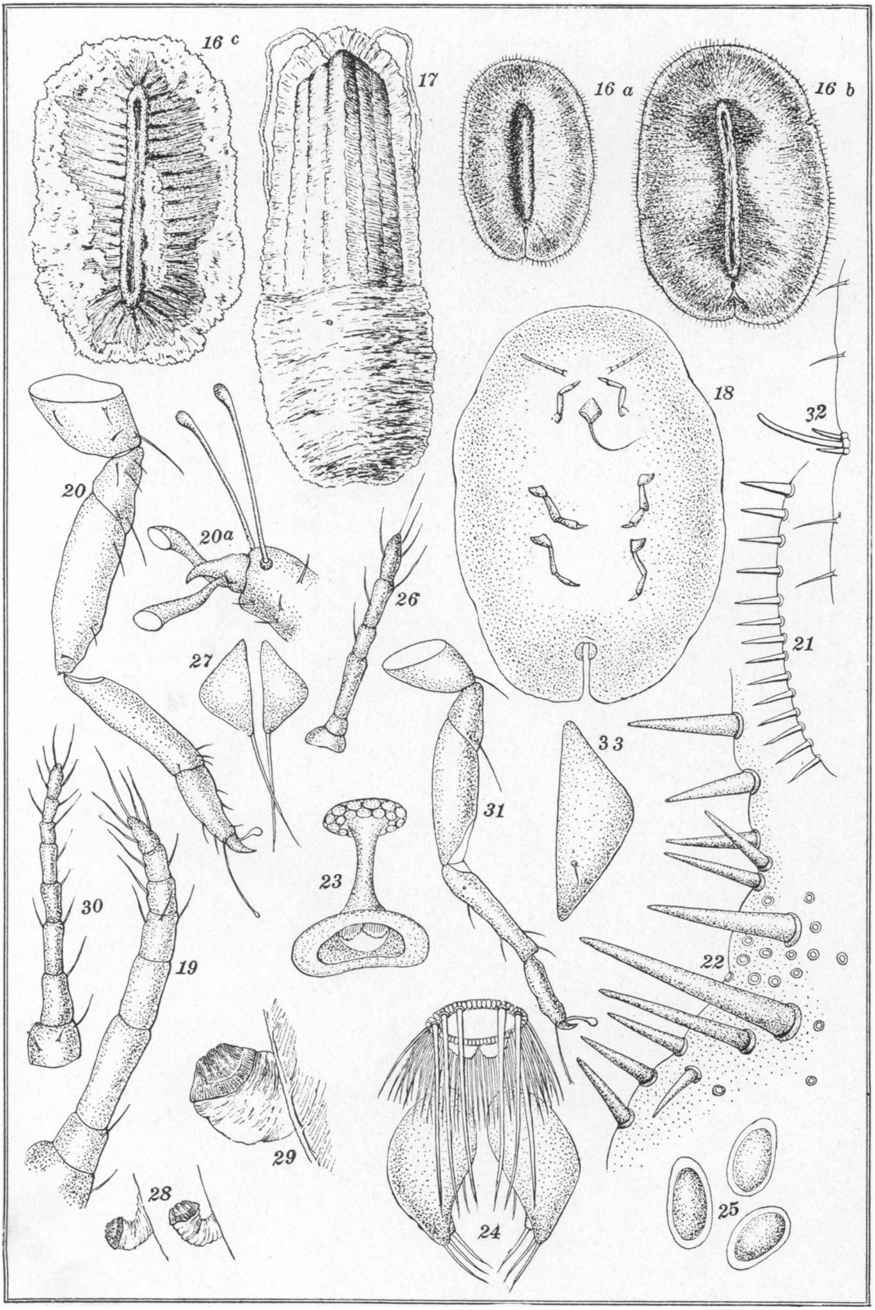
4. **Lichtensia japonica, new species.** (Pl. VIII, Figs. 16–27.)

Ovisac of Female.—Very elongate ovate, white, covering whole body; slightly narrowed in front, convex; front half with many longitudinal carinæ. Two long cottony filaments project anteriorly, near frontal margin. Length 7–9 mm.

Adult Female.—Immediately prior to the formation of the ovisac, pale yellowish brown, with dark brown irregular marking on the dorsum. A white cottony longitudinal bar on the dorsum. Broadly oval in form, convex; stigmatic clefts not very deep. Antennæ 8-jointed, the third the longest, the first joint always widest; formula 3, 4, 2, 8, 5, 6, 7, 1, or 3, 4, 8, 2, 5, 6, 7, 1; last few joints with many long hairs; about 1 mm. long. Legs very large and rather stout; trochanter very large, with one long and several small spines; tibia much longer than tarsus; tarsal digitules long rather stout hairs; those of claw short and club-shaped. Claw short, stout and curved. Marginal spines very strongly formed, tips very sharply pointed. Stigmatic area with three (sometimes four) spines and a group of spinnerets; one of these spines is very large, others much smaller and not much longer than the marginal spines. Dorsum with two longitudinal rows of short conical spines. Anal cleft not



Japanese Coccidae.



Japanese Coccidae.

very deep. Anal plates large, outer edge rounded; three to four spines at the apex and one at middle of the inner edge. Length 3–4 mm., width 2–3 mm.

Egg.—Oval in form, pale yellow in color. Length about .25 mm.

First Larval Stage.—Elongate in form. Antennæ and legs well formed; mouth parts very large. Antenna 6-jointed; third joint the longest, second joint the shortest; formula 3, 6, 5, 4, 1, 2. Tibia and tarsus about equal in length. Anal plates prominent, with one long spiny hair at their apices. Length about .3 mm.

Habitat.—Tokyo and Kanagawa, on *Thea japonica* L.; collected by the writer, May, 1905.

5. Takahashia citricola, new species. (Pl. VIII, Figs. 28–33.)

Adult Female.—Semicircular in form; orange in color, with dark marking on the dorsum. At the completion of the ovisac the body is free from the plant, resting on top of the sac as shown in the figure. Antennæ and legs well formed, but rather small and stout. Antenna 8-jointed, third joint the longest, first joint broadest; formula 3, 2, (4, 8), 1, 5, (6, 7); last few joints with many long hairs. Legs subequal; tibia longer than tarsus, almost twice as long as the latter; digitules of tibia long hairs, those of claw stout and short; claw stout and curved. Marginal spines simple. Stigmatic spines three, the median one much longer than the others. Anal ring with eight strong spine-like hairs. Anal plates large, outer angle rounded, a prominent spine near the apex. Length about 4 mm.

Habitat.—Kumamoto, Hukuoka and Wakayama, on *Citrus.* Collected by the writer, July, 1907.

This species is allied to *Takahashia japonica* Ckll., but differs in having a short ovisac and a small round body.

6. Pulvinaria camellicola, Sig.

Tokyo, on *Eurya ochnaceæ* Sgysz. It is common on this plant about Tokyo City, and very destructive, but I do not find it on *Thea* (*Camellia*) *japonica* L. It differs somewhat from the European form, especially in the shape of the ovisac.

7. Ceroplates rubens Mask.

Nagasaki, on *Diospyros kaki* L. f. and orange, collected by the writer in the summer of 1907. Although long since recorded from Japan, this is the first time this species has been found by the writer. It is probably introduced from some tropical country.

8. Lecanium (Saissetia) nigrum Nietn.

Liu-Kiu Island; collected by Mr. T. Taira from an unknown host, Liu-Kiu Agricultural Experiment Station, 1907. This is the first time this species has been found in Japan.

9. Lecanium (Coccus) fukayai, new species. (Pl. VII, Figs. 7–10.)

Adult Female.—Irregularly deltoid, very flat. Color pale green. Anal cleft more than one third the total length of the insect. Marginal spines simple; stigmatic spines not very long, simple. Antennæ usually 6- but rarely 7-jointed; third joint the longest; formula 3, 6, 2, 4, 5, 1. Legs well formed, but rather small; three pairs alike; tibia longer than tarsus; tarsal digitules fine hairs; those of claw unknown; claw large, curved. Anal plates bluntly pointed, base more than twice as long as outer edge; at the apex with four or five spiny hairs. Length about 2 mm.

Ibaraki, on vine, collected by C. Fukaya, March, 1907. Named after the collector, who is now working on Japanese Coccidæ under the direction of the writer.

The present species is allied to *Lecanium mangiferæ* Green, but differs markedly as follows: The antenna of *L. mangiferæ* is 8-jointed; the second and eighth equal and longest, while that of the new species is usually 6- and rarely 7-jointed, and the third is the longest. The extremities of the marginal spines of *L. mangiferæ* are divided into many forks, while those of the new species are simple and pointed.

10. Lecanium (Coccus) ochnaceæ, new species. (Pl. VII, Figs. 11–15.)

Adult Female.—Pale yellowish green; oval in outline, widest at thorax, very thin, broadly flattened, with slight median longitudinal ridge; stigmatic clefts shallow. Antennæ usually 8-, but rarely 7-jointed; third joint the longest; about .3 mm. long; formula 3, 8, 4, 2, 5, 6, 7, 1. Legs well developed and large; three pairs alike; tibia much longer than tarsus; claw large, curved; digitules ordinary. A row of several strong, spiny hairs on the ventral aspect, between the antennæ. Marginal hairs very prominent, divided at extremity; stigmatic spines three, the median one very long and slightly curved, the other two less than half as long. Anal plates large, outer angle evenly rounded; outer edge longer than base; several prominent spines at the apex. Length about 2.5 mm.

Tokyo, on *Eurya ochnacea* Szysz., collected by the writer, April, 1907.

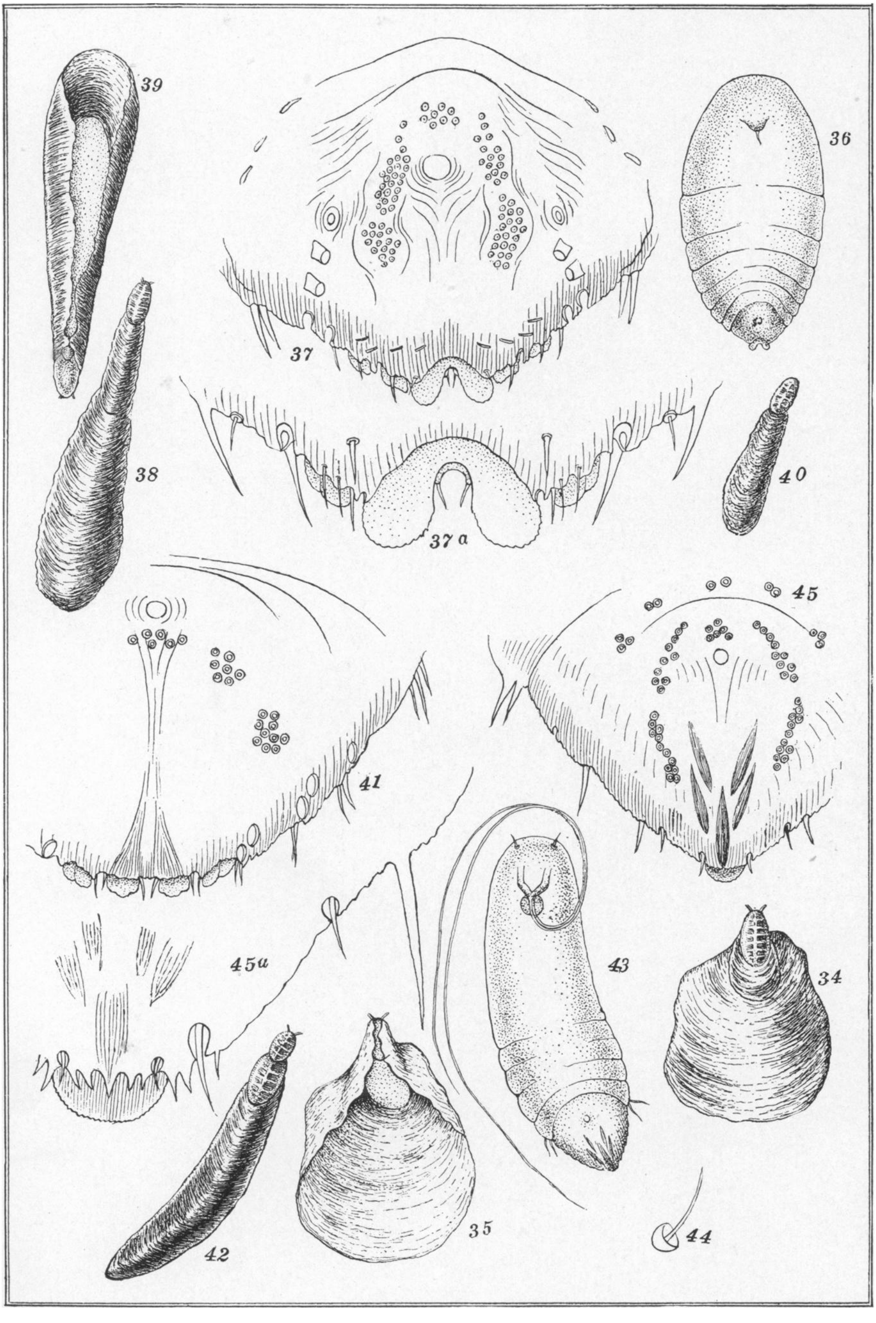
This species is allied to *Lecanium viride* Green, but there are many differences in the formula of the antenna.

11. Aspidiotus (Chrysomphalus) aurantii var. citrinus Coq.

This species is one of the common scale insects of *Citrus* in Japan, but it is not very destructive.

12. Aspidiotus (Chrysomphalus) rossi Mask.

Shizuoka and Chiba, on leaves and branches of *Pasania cuspidata* Oerst., collected by the writer, 1907.



Japanese Coccidae.

13. **Chionaspis (Phenacaspis) aucubæ Cooley.**

Tokyo, on *Aucuba japonica* Thunb., collected by the writer at Hibiya Park, Tokyo City, September, 1907.

14. **Chionaspis (Phenacaspis) latissima Ckll.**

This species is very common all over Japan on leaves of *Distylium racemosum* S. et Z.

15. **Chionaspis kinshinensis, new species.** (Pl. IX, Figs. 34–37.)

Female Puparium.—Pale straw color, opaque, rather thick in texture, very broadly and roundly dilated, so that the width usually equals the length; slightly convex. Pellicles pale; first exuvia oblong, segmentation distinct, last abdominal segment yellow, about .3 mm., second exuvia subcircular, about .5 mm. Ventral scale white, very thin. Size about 2 mm.

Male Puparium.—Unknown to the writer.

Adult Female.—Oblong, slightly pinkish in color; abdominal segments distinct. Last abdominal segment presenting the following characters: The anterior group of spinnerets consists of five to eight, the anterior laterals twenty to twenty-five, posterior laterals about twenty-one. The median lobes are large, oblong, contiguous at the proximal end, and widely separated at their distal extremities; their margins serrate; the second lobes of each side incised near its lateral end, the mesal lobule being almost three times as large as the lateral; third lobes well formed, with incision at middle, the mesal lobule being larger than lateral. The plates are arranged as follows: 1, 1, 2; the first one between mesal and second lobes, the second between second and third lobes and the third beyond the third. Spines as usual.

Fukuoka, on the trunk of *Quercus* sp., collected by the writer, 1907.

This species is allied to *Chionaspis colemani* Kuw. in the shape of scale, color and texture, but is distinguished from the latter by the structure of the last abdominal segment.

16. **Mytilaspis (Lepidosaphes) buzenensis, new species.** (Pl. IX, Figs. 38–40.)

Female Puparium.—Long and narrow, straight, widening gradually toward posterior extremity. Color dark brown, opaque, with a very narrow, irregular, flattened border, which is whitish gray and transversely marked by curved lines of growth. Pallicles very pale yellow, subtransparent, occupying about one third the total length of the scale; the first exuvia oval; segmentation distinct; antennal filaments well seen, about .3 mm. long; second exuvia very much larger than the first, posterior extremity yellow, about .8 mm. Ventral scale incomplete, broadly divided. Length about 2.5–3 mm., width about .5 mm.

Male Puparium.—Very much resembles that of female, but smaller; line of growth not so pronounced; pale brown in color; irregular whitish flattened border almost wanting; ventral scale incomplete. Length about 1.5 mm.

Adult Female.—Long elliptical, lateral margins nearly straight, slightly wider toward posterior end. The last abdominal segment presents the following characters: The anterior group of spinnerets are six; the anterior laterals about seven, and the posterior laterals about nine. The median lobes well developed with the margins crenate, the second lobe deeply incised, the margins of the lobules crenate; the third lobe is wanting. The plates are not very large, but prominent and simple, tapering; there are two of them in each of the following places: between median lobes, between first and second lobes, and several more beyond the second lobes. Spines prominent, one on the base of each lobe. Length about 1.65 mm., width .5 mm.

Buzen, Kiushiu, on vine, collected by the writer, June, 1907.

The present species is allied to *Mytilaspis gloveri* Pack., but the large second exuvia and rather short scale widening gradually toward posterior extremity are good characters for separating it from the latter.

17. **Mytilaspis (Lepidosaphes) uniloba, new species.** (Pl. IX, Figs. 42–45.)

Female Puparium.—Long and narrow, straight or curved; sides almost parallel, but slightly widening toward the posterior extremity, with whitish, narrow, flattened border. Color dark brown, with pale margin; the older specimens pale white. Pellicles pale yellow, occupying about one third the total length of the scale. The first exuvia oval, about .3 mm., cross ridges well marked; second exuvia large, about .6 mm. Ventral scale incomplete. Length 2–3 mm., width about .5 mm.

Male Puparium.—Unknown to the writer.

Adult Female.—Pale yellow, with the last abdominal segment yellow; elongate in form, lateral margin straight, and approximately parallel; the abdominal area being wider than the anterior parts. The abdominal segments short, the lateral margins not much produced; next to the last abdominal segment with two stout, spine-like processes and many short spines. The last abdominal segment presents the following characters: The anterior group of spinnerets four, the anterior laterals ten to twelve, and the posterior laterals eleven to fourteen (some specimens show three or four more groups of spinnerets above the anterior group, which is shown in the figure). There is only a single lobe which is very large and crenate; four simple plates on each side, two of them are very large, while the other two are smaller. Length about 1.5 mm., width about .5 mm.

Habitat.—Hiogo, on *Osmanthus,* collected by the writer, March, 1907.

This species can be readily distinguished from all others in the genus by its single median lobe. The supplemental gland pores or spinnerets, shown in the figure do not appear to be constant.

18. Mytilaspis (Lepidosaphes) machili Mask.

Tokyo, on *Machilus thunbergii* S. et Z., collected by the writer, March, 1907. It was recorded from Japan some years ago by Maskell, but this is the first time that the writer has seen the species in his native country.

EXPLANATION OF PLATES.

PLATE VII.

Asterolecanium pasaniæ sp. nov. (Kuw. & Ckll.).

Fig. 1. Scales on leaf of *Pasania cuspidata.*
Fig. 2. Female scale from above.
Fig. 3. Female from below.
Fig. 4. Antenna of the same.
Fig. 5. Marginal glands of the same.
Fig. 6. Abdominal end of the same.

Lecanium fukayai sp. nov.

Fig. 7. Adult female from below.
Figs. 8, 8*a*. Antennæ of the same.
Figs. 9, 9*a*. Leg of the same.
Fig. 10. Anal plates of the same.

Lecanium ochraceæ sp. nov.

Fig. 11. Female from above.
Figs. 12, 12*a*. Antennæ of the same.
Figs. 13*a*, 13*b*, 13*c*, 13*d*. Legs of the same.
Fig. 14. Marginal and stigmatic spines of the same.
Fig. 15. Anal plates of the same.

PLATE VIII.

Lichtensia japonica sp. nov.

Figs. 16*a*, 16*b*, 16*c*. Female, different stages prior to the formation of the ovisac.
Fig. 17. Female with ovisac.
Fig. 18. Female from below.
Fig. 19. Antenna of the same.
Figs. 20, 20*a*. Leg of the same.
Fig. 21. Marginal spines.
Fig. 22. Stigmatic spines.
Fig. 23. Spiracle.
Fig. 24. Anal ring and plates.
Fig. 25. Eggs.

Fig. 26. Antenna of first larval stage.
Fig. 27. Anal plates of the same.

Takahashia citricola sp. nov.

Fig. 28. Female, natural size.
Fig. 29. The same, enlarged.
Fig. 30. Antennæ of the same.
Fig. 31. Leg of the same.
Fig. 32. Marginal and stigmatic spines of the same.
Fig. 33. Anal plates.

PLATE IX.

Chionaspis kinoshinensis sp. nov.

Fig. 34. Female scale from above.
Fig. 35. The same from below.
Fig. 36. Female.
Fig. 37. Last abdominal segment of the same.

Mytilaspis buzenensis sp. nov.

Fig. 38. Female scale from above.
Fig. 39. The same from below.
Fig. 40. Male scale from above.
Fig. 41. Last abdominal segment of female.

Mytilaspis uniloba sp. nov.

Fig. 42. Scale of female from above.
Fig. 43. Female from below.
Fig. 44. Antenna of the same.
Figs. 45, 45*a*. Last abdominal segment of the same.

COCCIDÆ OF JAPAN (IV). A LIST OF COCCIDÆ FROM THE BONIN ISLANDS (OGASAWARA-JIMA), JAPAN.

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(WITH PLATES X–XII.)

The following species of Coccidæ or scale insects were collected by the writer in the Bonin Islands, where he was sent by the Department of Agriculture and Commerce for the purpose of investigating the migratory locust of the islands, in the summer of 1907.